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Variant of the cutting plane method with approximation of the set of constraints and auxiliary functions epigraphs

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Abstract

© Springer International Publishing AG, part of Springer Nature 2018. We propose a method of solving a convex programming problem, which is based on the ideas of cutting plane methods and the method of penalty functions. To construct each approximation, the method uses an operation of immersing the epigraph of auxiliary function into a polyhedral set. The auxiliary function is constructed as the sum of the objective function and the external penalty function of the constraint area. In addition, an admissible set of the original problem is immersed in the polyhedron simultaneously. In connection with this, the problem of constructing an iterative point is a linear programming problem, in which constraints are polyhedrons approximating the epigraph of auxiliary function and the admissible set. Both next approximating sets are based on the previous ones by cutting off the iterative point from them by hyperplanes. The convergence of the method is proved. We describe its algorithms. One of them can be the implementation of the method of penalty functions.

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Keywords

Algorithm, Approximating set, Conditional minimization, Convergence, Cutting hyperplane, Epigraph, Iterative point, Penalty function, Subgradient

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